

1. A slanted hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- 5 (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- (e) a photoinitiator dye;

10 wherein the hologram has opposing surfaces and a plurality of polymer regions having a first refractive index and polymer-dispersed liquid crystal regions having a second refractive index disposed at an angle to the opposing surfaces of the hologram whereby the
15 symmetry axis of the liquid crystal is disposed at an angle to the opposing surfaces of the hologram.

2 The slanted hologram of claim 1, wherein the polymerizable monomer comprises dipentaerythritol hydroxypentaacrylate.

3. The slanted hologram of claim 1, wherein the polymer-dispersed liquid crystal material further comprises, before exposure, a surfactant.

4. The slanted hologram of claim 1, wherein:

(a) the liquid crystal comprises 10-40% by total weight of the polymer-dispersed liquid crystal material;

5 (b) the cross-linking monomer comprises 5-15% by total weight of the polymer-dispersed liquid crystal material;

(c) the amount of coinitiator is 10^{-3} to 10^{-4} gram moles; and

10 (d) the amount of photoinitiator dye is 10^{-5} to 10^{-6} gram moles.

5. The slanted hologram of claim 1, wherein:

(a) the liquid crystal comprises 10-40% by total weight of the polymer-dispersed liquid crystal material;

5 (b) the cross-linking monomer comprises 10-18% by total weight of the polymer-dispersed liquid crystal material;

(c) the coinitiator comprises 2-3% by total weight of the polymer-dispersed liquid crystal material; and

10 (d) the photoinitiator dye comprises 0.2-0.4% by total weight of the polymer-dispersed liquid crystal material.

6. The slanted hologram of claim 2, wherein the surfactant comprises about 6% by total weight of the polymer-dispersed liquid crystal material.

7. The slanted hologram of claim 2, wherein the surfactant comprises about 5-10% by total weight of the polymer-dispersed liquid crystal material.

8. The slanted hologram of claim 2, wherein the liquid crystal includes a mixture of cyano biphenyls.

9. The slanted hologram of claim 1, wherein the cross-linking monomer comprises N-vinylpyrrolidone.

10. The slanted hologram of claim 1, wherein the coinitiator comprises N-phenylglycine.

11. The slanted hologram of claim 1, wherein the photoinitiator dye comprises rose bengal ester.

12. The slanted hologram of claim 3, wherein the surfactant comprises octanoic acid.

13. The slanted hologram of claim 4, wherein the polymer-dispersed liquid crystal material further comprises, before exposure, a surfactant.

14. The slanted hologram of claim 5, wherein the polymer-dispersed liquid crystal material further comprises, before exposure, a surfactant.

15. The slanted hologram of claim 4, wherein the polymerizable monomer comprises dipentarythritol hydroxypentaacrylate.

16. The slanted hologram of claim 5,
wherein the polymerizable monomer comprises
dipentarythritol hydroxypentaacrylate.

17. A slanted hologram made by exposing an
interference pattern inside a polymer-dispersed
liquid crystal material, the polymer-dispersed
liquid crystal material comprising, before
5 exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- 10 (e) a photoinitiator dye;

wherein the hologram has opposing surfaces
and a plurality of alternative planes of polymer
channels having a first refractive index and
polymer-dispersed liquid crystal channels having
15 a second refractive index disposed at an angle
to the opposing surfaces of the hologram whereby
the symmetry axis of the liquid crystal is
disposed at an angle to the opposing surfaces of
the hologram.

18. The slanted hologram of claim 17,
wherein the polymerizable monomer comprises
dipentarythritol hydroxypentaacrylate.

19. The slanted hologram of claim 17,
wherein the polymer-dispersed liquid crystal
material further comprises, before exposure, a
surfactant.

20. The slanted hologram of claim 17,
wherein:

(a) the liquid crystal comprises 10-
40% by total weight of the polymer-dispersed
5 liquid crystal material;

(b) the cross-linking monomer
comprises 5-15% by total weight of the polymer-
dispersed liquid crystal material;

(c) the amount of coinitiator is 10^{-3}
10 to 10^{-4} gram moles; and

(d) the amount of photoinitiator dye
is 10^{-5} to 10^{-6} gram moles.

21. The slanted hologram of claim 17,
wherein:

(a) the liquid crystal comprises 10-
40% by total weight of the polymer-dispersed
5 liquid crystal material;

(b) the cross-linking monomer
comprises 10-18% by total weight of the polymer-
dispersed liquid crystal material;

(c) the coinitiator comprises 2-3% by
10 total weight of the polymer-dispersed liquid
crystal material; and

(d) the photoinitiator dye comprises
0.2-0.4% by total weight of the polymer-
dispersed liquid crystal material.

22. The slanted hologram of claim 18,
wherein the surfactant comprises about 6% by
total weight of the polymer-dispersed liquid
crystal material.

23. The slanted hologram of claim 18, wherein the surfactant comprises about 5-10% by total weight of the polymer-dispersed liquid crystal material.

24. The slanted hologram of claim 18, wherein the liquid crystal includes a mixture of cyano biphenyls.

25. The slanted hologram of claim 17, wherein the cross linking monomer comprises N-vinylpyrrolidone.

26. The slanted hologram of claim 17, wherein the coinitiator comprises N-phenylglycine.

27. The slanted hologram of claim 17, wherein the photoinitiator dye comprises rose bengal ester.

28. The slanted hologram of claim 19, wherein the surfactant comprises octanoic acid.

29. The slanted hologram of claim 20, wherein the polymer-dispersed liquid crystal material further comprises, before exposure, a surfactant.

30. The slanted hologram of claim 21, wherein the polymer-dispersed liquid crystal material further comprises, before exposure, a surfactant.

31. The slanted hologram of claim 20, wherein the polymerizable monomer comprises dipentarythritol hydroxypentaacrylate.

32. The slanted hologram of claim 21, wherein the polymerizable monomer comprises dipentarythritol hydroxypentaacrylate.

33. A static hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- (e) a photoinitiator dye;

wherein the hologram has a plurality of polymer regions having a first refractive index and polymer-dispersed liquid crystal regions having a second refractive index wherein at least a portion of the liquid crystal in the polymer-dispersed liquid crystal regions has been removed.

34. A static hologram made by exposing an interference pattern inside a polymer-dispersed liquid crystal material, the polymer-dispersed liquid crystal material comprising, before exposure:

- (a) a polymerizable monomer;
- (b) a liquid crystal;
- (c) a cross-linking monomer;
- (d) a coinitiator; and
- (e) a photoinitiator dye;

wherein the hologram has a plurality of alternating planes of polymer channels having a first refractive index and polymer-dispersed liquid crystal channels having a second refractive index wherein at least a portion of the liquid crystal in the polymer-dispersed liquid crystal channels has been removed.

35. A method for preparing static hologram, comprising:

disposing a polymer-dispersed liquid crystal material between transparent plates;

exposing an interference pattern inside the polymer-dispersed liquid crystal material thereby forming a hologram having polymer regions having a first refractive index and polymer-dispersed liquid crystal regions having a second refractive index; and

removing at least a portion of the liquid crystal in the polymer-dispersed liquid crystal channels.

36. A method for preparing a static hologram, comprising:

disposing a polymer-dispersed liquid crystal material between transparent plates;

5 exposing an interference pattern inside the polymerdispersed liquid crystal material thereby forming a hologram having alternating planes of polymer channels having a first refractive index and polymer-dispersed liquid crystal channels
10 having a second refractive index; and

removing at least a portion of the liquid crystal in the polymer-dispersed liquid crystal channels.

37. The method of claims 35 or 36, wherein a portion of the liquid crystal in the polymer-dispersed liquid crystal channels is removed by disposing the hologram in a solvent.